Cable Agreement Compliance

Audit 1of 3

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1. Executive Summary

This audit evaluates TCI of Washington, Inc.'s (TCI) compliance with the original franchise agreement between the City of Seattle (the City) and TCI and the franchise extension ordinance no. 119183. A technical evaluation and a service availability evaluation were conducted for the Alki/West Seattle service area and the TCI II franchise area between June 10, 1999 and July 8, 1999.

The audit verifies that customers in Alki/West Seattle currently have access to both expanded programming and cable modem services as defined in the extension ordinance. Customers in TCI II currently have access to expanded programming, but not to @Home services. Expanded programming for video and @Home services was confirmed through both an engineering audit of the fiber optic nodes and by customer interviews.

The auditors have also reviewed internal node activation reports produced by TCI to confirm the number of customers activated each month between April and June 1999. These reports were reviewed to determine whether or not TCI has met the requirements of activating 7,000 customers per month. Our evaluation indicates that TCI is in compliance with their construction and activation schedules.

The engineering evaluation shows that TCI's upgraded system does provide a minimum of 70 analog channels, and is 750 MHz capable. TCI's network is fully redundant with minimal outages, and the network quality capacity, reliability and performances are acceptable.

A service activation evaluation conducted by interviewing TCI customers clearly shows that customers have access to expanded services. However, the interviews show mixed results in terms of the quality of those services and customer satisfaction. Although the results are mostly satisfactory, a significant portion of customers is not satisfied with the current level of service. Poor program content and customer service problems were the biggest issues for cable TV customers. Speed and customer service problems were the biggest issues for @Home customers.

2. Introduction

This is the first of three audits performed to determine TCI's compliance with the requirements of their cable television franchise and franchise extension ordinance no. 119183. This audit evaluates the upgrade of TCI's network to accommodate 70 channels and 750 MHz capacity throughout areas currently upgraded, under both the original 1996 franchise agreement, and the franchise extension ordinance that took effect this year. The audit evaluates traditional video services as well as @Home services. The Alki and West Seattle customers can subscribe to both expanded basic cable TV and @Home services, and TCI II customers are offered expanded basic cable TV service only. While Alki and West Seattle were evaluated for cable TV and Internet services, TCI II was evaluated only for cable TV services. Audits Two and Three will assess TCI's network upgrade for the remaining parts of the City of Seattle.

This audit consists of both a technical evaluation of the TCI network and a service evaluation of TCI customers. The technical evaluation includes certification review, node testing and network reliability and performance, while the service evaluation involves interviewing TCI customers to determine access to service and customer satisfaction. The technical evaluation is detailed in Sections 3 and 4. The service availability evaluation is detailed in Section 5.

Technical Evaluation

The auditors reviewed the certifications received by the City of Seattle from TCI confirming node activation from January 1999 through June 1999.

Technical evaluations of the nodes in West Seattle and TCI II were performed on June 23 and June 30, 1999, respectively. Nodes were randomly chosen to represent the general population of each area. Five nodes were tested in West Seattle, two in Alki and six in TCI II. Each node was tested for channel capacity only.

The auditors also performed a reliability and performance evaluation to ensure that TCI's network is built and maintained satisfactorily to provide a high level of customer satisfaction. This evaluation includes assessing the following performance elements:

- Redundancies
- Fiber protection
- Power supply compliance (standby power systems, minimum of 4 hours autonomy)
- MTBF (mean time between failures) and MTTR (mean time to repair)
- Y2K Compliance

Both the certification review and reliability and performance evaluation were conducted using TCI's maintenance records.

Service Availability Evaluation

The service availability portion of this audit assesses whether or not TCI offers additional cable television channels and high-speed Internet service to customers in Alki, West Seattle and TCI II. It also assesses customer satisfaction for each service. The service availability study was completed by interviewing 35 TCI cable TV and @Home customers[1] via telephone over the course of three weeks. Of the 35 customers interviewed, 25 customers live in Alki and West Seattle and 10 live in TCI II. Twenty-six interviews were completed for cable TV and 24 were completed for @Home.

The purpose of the survey was to determine whether or not expanded basic customers have access to 70 programming channels and Alki/West Seattle customers have access to the Internet through @Home service. It also rates the quality of programming and functionality of the cable TV service and the speed and functionality of the @Home service. In addition to determining access to service and quality of service, the survey results indicate the level of customer service satisfaction in terms of professionalism and knowledge of TCI and @Home's customer service staff.

[1] Although the survey results reflect trends in service availability and customer satisfaction, the results taken from a small sample size of 35 are qualitative and therefore not statistically significant.

3. Certification

3. 1 Network Status

3.1.1 Infrastructure

Cable uses a sophisticated network of technologies that effectively combines point-to-point microwave, satellites, and fiber optic and coaxial cables. In order to provide an understanding of the network architecture and functionality as well as the description of various individual elements that are deployed in TCI's network, an overview of the functional configuration of the TCI network is given in Figure 1.

There are six or eight hubs[2] within the Seattle network, which are linked to two headends by two pairs of fiber cables. Aerial and underground fiber cables are installed between the hub and the nodes. From the nodes, coaxial cables are connected to the customer premises. The cables are in satisfactory condition as evaluated one year after installation. There are approximately 125 nodes within the network, each serving approximately 1,200 homes. Figure 1 is an illustration of the network architecture with eight hubs. The configuration and the quantities of hubs and nodes within the network will be confirmed by a site visit during the next audit.

3.1.1.1 Headend

The headend houses the electronics equipment for the cable television system and @Home Internet services. Signals from broadcast transmissions, satellites and local television studios are received and processed at the system headend.

The headend receives TV signals via various transmission media (satellite, off-air and fiber) and coverts them to optical signals which can be sent over fiber. To deliver digital data, the headend controller modulates the IP packets, encodes them as a digital signal and transmits the signal down the cable on an unused channel. TCI's Internet services feeds in from Denver where the control and monitoring take place.

[2] The auditors received conflicting information as to the number of hubs on TCI's network. The number will be confirmed when the auditors do an on-site inspection of the network.

TCI CABLE NETWORK ARCHITECTURE - SEATTLE

[insert figure 1 network diagram]

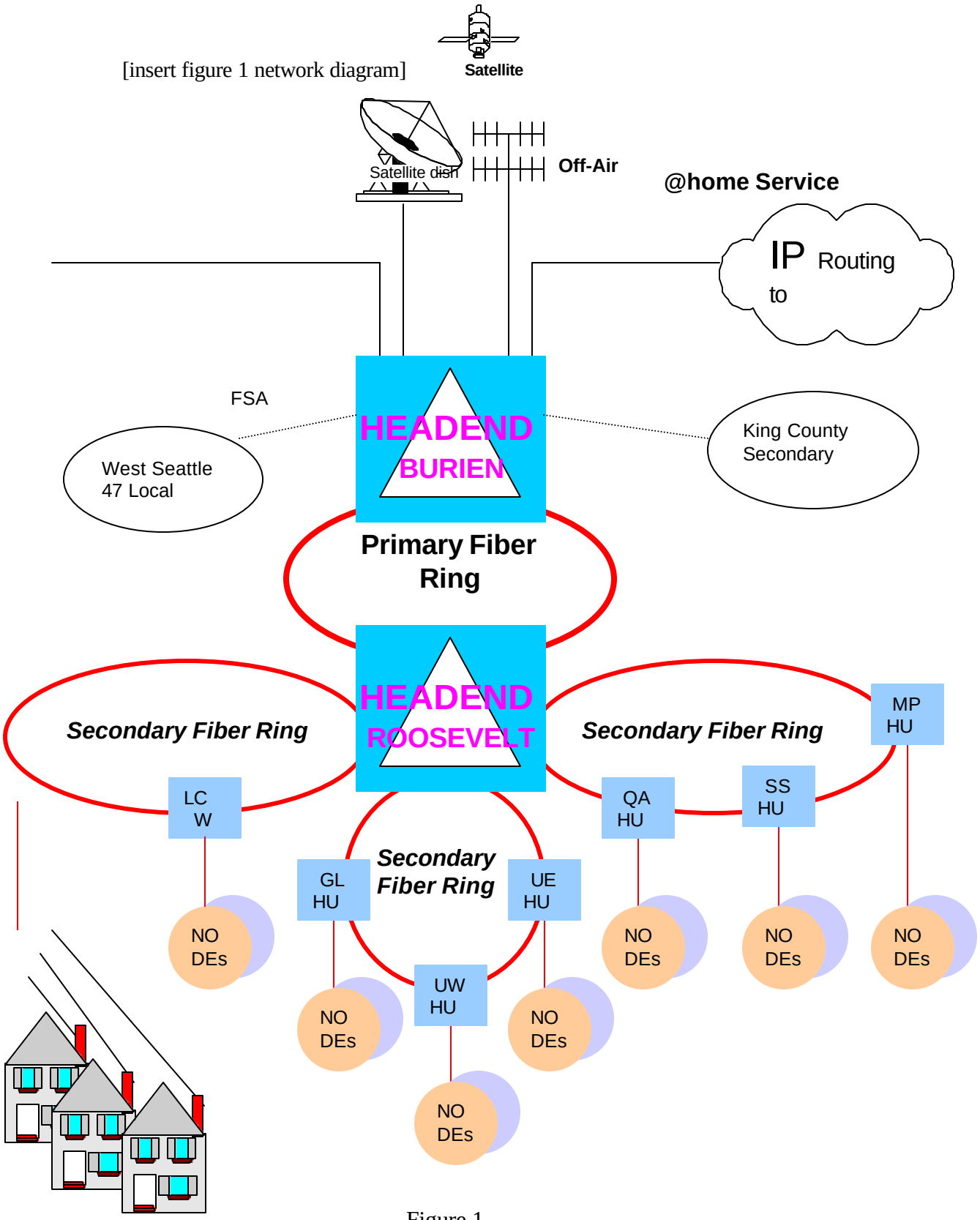

Figure 1

3.1.1.2 Hybrid Fiber & Coax (HFC)

TCI deploys HFC grid to deliver both cable television (CATV) and Internet services, and has installed considerable new aerial fiber optic cables on poles throughout Seattle. Fiber optic cables are the main trunk cables with coaxial cable reaching into homes from the nodes.

3.1.1.3 Node

To send television signals and data over an HFC network, laser transmitters convert signals sent from the headend into optical signals. This conversion occurs in node boxes which are usually attached to poles and are environmentally protected. At various points within the network, close by the residences or businesses, laser receivers at each node reconvert the optical signals into electrical signals.

3.1.1.4 Customer Premises

At a customer's premises, a cable splitter is installed. The cable splitter sends one cable to the computer's cable modem and the other to the TV set.

The specification of cable modem used in TCI network is set forth in Appendix 1.

3.1.2 Build Areas: Alki/West Seattle and TCI II

Table 1 summarizes the number of customers that have been activated for the nodes in Alki, West Seattle and TCI II. Tables 2, 3 and 4 show the statistics of each node including the number of new customers reached by each node.

Table 1: Customers Activated

Build Area	No. of Nodes	No. of homes passed	No. of customers	Construction complete date	Activation date
Alki	11	10822	6812	10/31/98 – 12/18/98	11/11/98 – 3/9/99
West Seattle	47	23981	15595	10/1/96	7/7/98 – 8/11/98
TCI II	15	16291	9341	1/29/99 – 2/28/99	3/16/99
Total	**73**	**51094**	**31748**		

Table 2: West Seattle

Node	No. of homes passed	No. of Customers	Construction complete date	Activation date	Comments
WS01	311	235	10/1/96	8/4/98	
WS02	603	452	10/1/96	7/14/98	Tested
WS03	424	267	10/1/96	8/4/98	
WS04	320	243	10/1/96	8/4/98	
WS05	583	378	10/1/96	8/4/98	
WS06	498	402	10/1/96	8/4/98	
WS07	601	496	10/1/96	8/4/98	
WS08	545	381	10/1/96	8/4/98	
WS09	561	346	10/1/96	8/4/98	
WS10	478	318	10/1/96	8/4/98	
WS11	481	330	10/1/96	8/4/98	
WS12	557	322	10/1/96	7/28/98	
WS13	533	341	10/1/96	7/28/98	Tested
WS14	557	387	10/1/96	7/28/98	
WS15	703	432	10/1/96	7/28/98	
WS16	504	359	10/1/96	7/28/98	
WS17	270	207	10/1/96	7/21/98	
WS18	544	416	10/1/96	7/21/98	
WS19	394	284	10/1/96	7/28/98	
WS20	532	310	10/1/96	7/21/98	
WS21	616	419	10/1/96	7/21/98	Tested
WS22	578	397	10/1/96	8/4/98	
WS23	616	296	10/1/96	7/14/98	
WS24	548	313	10/1/96	7/14/98	
WS25	654	348	10/1/96	8/11/98	
WS26	599	407	10/1/96	8/11/98	
WS27	748	565	10/1/96	8/11/98	
WS28	496	314	10/1/96	8/11/98	
WS29	590	320	10/1/96	8/11/98	Tested
WS30	449	288	10/1/96	8/11/98	
WS31	446	280	10/1/96	8/11/98	
WS32	543	302	10/1/96	8/11/98	
WS33	576	216	10/1/96	7/21/98	
WS34	517	653	10/1/96	8/11/98	
WS35	454	274	10/1/96	8/11/98	
WS36	573	372	10/1/96	7/14/98	
					Missing
WS38	489	292	10/1/96	7/14/98	
					Missing
WS40	571	326	10/1/96	8/11/98	
WS41	457	299	10/1/96	8/11/98	
WS42	316	203	10/1/96	7/14/98	
WS43	470	254	10/1/96	7/21/98	
WS44	476	248	10/1/96	7/14/98	
WS45	500	303	10/1/96	7/14/98	
WS46	229	136	10/1/96	7/21/98	
WS47	399	210	10/1/96	7/14/98	
WS48	484	247	10/1/96	7/7/98	Tested
WS49	588	407	10/1/96	7/7/98	
Total	**23981**	**15595**			

Table 3: Alki

Node	No. of homes passed	No. of Customers	Construction complete date	Activation date	Comments
WS56	140	86	10/31/98	11/11/98	
WS57	711	447	10/31/98	11/18/98	
WS58	1277	799	11/10/98	11/19/98	
WS59	632	443	12/18/98	3/9/99	
WS60	1331	745	11/10/98	11/18/98	
WS61	757	498	11/10/98	11/11/98	Tested
WS62	1249	727	11/10/98	11/19/98	
WS63	1258	768	11/10/98	11/18/98	Tested
WS64	941	621	11/10/98	11/19/98	
WS65	1246	832	11/5/98	11/11/98	
WS66	1280	846	11/5/98	11/11/98	
Total	**10822**	**6812**			

Table 4: TCI II

Node	No. of homes passed	No. of Customers	Construction complete date	Activation date	Comments
GL16	1193	714	2/28/99	3/16/99	Tested
GL17	1179	730	2/28/99	3/16/99	
GL18	1252	807	2/28/99	3/16/99	Tested
GL19	1166	740	2/28/99	3/16/99	
GL20	1036	722	2/28/99	3/16/99	Tested
GL21	1319	712	2/28/99	3/16/99	
GL22	1015	590	2/28/99	3/16/99	
GL23	1165	612	2/28/99	3/16/99	
GL24	939	503	1/29/99	3/16/99	
GL25	1102	661	2/28/99	3/16/99	
GL26	1127	591	2/28/99	3/16/99	Tested
GL27	763	417	2/28/99	3/16/99	Tested
GL28	1077	565	1/29/99	3/16/99	
GL29	1175	579	1/29/99	3/16/99	
GL30	783	398	1/29/99	3/16/99	Tested
Total	**16291**	**9341**			

3.2 Compliance Verification of TCI Reports

A total of 73 nodes are evaluated in this report, as shown in Table 1 above. Tables 2, 3 and 4 show the number of customers activated per node and when full service was made available by each node. The nodes highlighted in red were inspected and tested.

3.2.1 Network Reliability and Performance

Maintaining a network to provide consistent reliability and high quality is an ongoing process. To maintain customer satisfaction, comprehensive network management, and preventive and corrective maintenance practices are necessary. The criteria used to determine reliability and performance for this audit were redundancy, power supply, mean time between failures (MTBF) and mean time to repair (MTTR). After reviewing TCI's maintenance records to evaluate the performance criteria, the engineering auditor confirms a reliable and high quality network. Details of these evaluation criteria follow.

3.2.1.1 Redundancies

As depicted in the TCI network architecture, redundancies are built in the system especially at the headend, which is central to the network. Two headends are available and are connected to a fiber ring. The two headends provide redundancy for each other. In addition the fiber ring is self-healing. All the equipment has main and hot standby. The expectation is that any major fault occurring at either of the headends will be restored as soon as possible (usually within seconds) and that outages will be transparent to the customers.

3.2.1.2 Power Supply

The system at the headend operates on –48 V DC. There is an uninterrupted power supply (UPS) system with battery backup and a standby generator for the headends. The @Home nodes have a separate UPS system.

3.2.1.3. MTBF/MTTR

West Seattle was completely activated on 8/11/1998. For the period of six months (January 1999 to June 1999) 34 outages have been recorded. The availability of the system during this period is 99.9469%, which is equivalent to 279 minutes/year. The mean time to repair (MTTR) is 2.44 hours.

Overall, the maintenance records prove that the network is well-maintained and the mean time to repair is within the required 24 hour time period. See Appendix 2 for copies of TCI maintenance records.

4. Node Testing

Node testing was completed to verify 750 MHz node capacity. Due to TCI and @Home's limited testing resources, this audit was not able to confirm data transmission rates (of 1.5 Mbps downstream and 96 Kbps upstream) or a maximum contention rate of 3 %. We are working with @Home to resolve this issue for the audits Two and Three.

4.1 Procedure

Nodes tested were randomly selected from testing areas as depicted on the map in Appendix 3 and in Tables 2, 3 and 4 above.

Tests of the Alki/West Seattle nodes were conducted in the evening between 7:30 p.m. and 10:30 p.m. on June 23, 1999. Test for TCI II area nodes were conducted between 6:00 p.m. and 8:00 p.m. on June 30, 1999. Tests were conducted during the early evening to cover the peak period for the utilization of both the TV and Internet services.

The tests were actually conducted by a TCI employee and verified at the site by the auditor. At least two TCI employees accompanied the auditor during the node tests.

4.2 Nodes Tested

For West Seattle build area, seven Nodes (2, 13, 21, 29, 48, 61 and 63) were selected and tested. Similarly, in TCI II (Zip Code 98133 coverage), six Nodes (16, 18, 20, 26, 27 and 30) were selected and tested.

4.3 Test Results

CATV RF Spectrum is given in Figure 2 to show the frequency range of the spectrum and channel allocation. Figure 2 is an exact replica of the test results of the spectrum. The test results show that each node tested has 70 channels and 750 MHz capacity.

CABLE TELEVISION RADIO FREQUENCY SPECTRUM

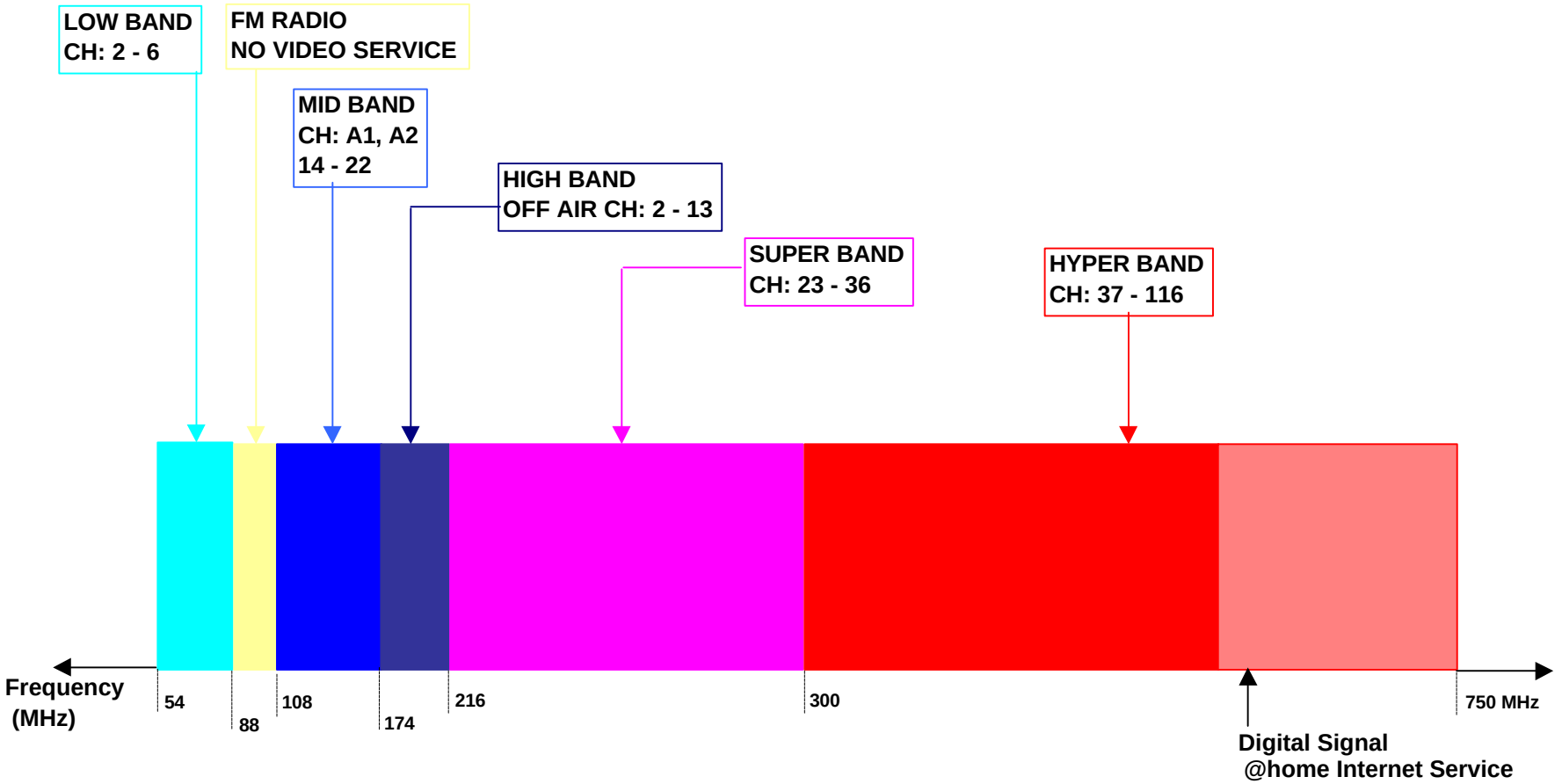

FIGURE 2

NB: Not to scale

4.4 Compliance

4.4.1 750 MHz Node Capacity

The scan graphs in Appendix 4 show that TCI has met the 750 MHz, 70 channel requirements for the areas tested. From the frequency spectrum graphs, it is apparent that there were no interference or distortion to the signals at the time of the testing. The network performed satisfactorily at the time of testing.

4.4.2 Customer Activations

Table 5 summaries the number of nodes and number of customers activated between January and June 1999. TCI has activated 27,297 customers as of the end of June. This clearly meets extension ordinance requirements of 21,000 customers[3] activated by June. TCI's high monthly average of activated customers (9,093/month) is due to 19,186 customers activated by April. Monthly activations have decreased and fall below an average of 7,000 /month for the months of May and June. For the construction, the number of homes passed totals 47,540, or 7,923 per month for six months and 11,885 over four months.

Table 5: City of Seattle Customer Activations

Month Ending 1999	Build Areas	No. of Nodes	No. of Homes passed	No. of customers activated	Total activations / month
January					
February					
March	BH01.01 BH06.02 GL04	2 1 15	1,502 632 16,291	706 443 9,341	10,490
April	GL02 GL01	9 10	7,820 9,076	4,429 4,267	8,696
May	GL01 GL03 QA01.02	1 2 2	434 1,394 2,265	322 1,059 1,482	2,863
June	QA03.01 BH01.03 GL03	2 2 9	2,304 649 5,173	1,517 369 3,344	5,230
Total		55	47,540	27,279	9,093[4]

[3] As per Seattle Upgrade Schedule: 62,615 Upgraded Totals / 9months = 6,957 activations/month
[4] Figures for March and April are included in April activations: (19,186 + 2,863 + 5,230) / 3 = 9,093 activations/month

4.4.3 Internet Capability

Internet capability is difficult to measure at the node. It is expected that digital signals do not show on the node tests. As depicted in Figure 2, digital signals appear at unused channels after the last video channel within the 54 – 750 MHz spectrum.

To give the auditor an idea of quality and the capability of the @Home service, a video file from www.starwars.com was downloaded within a few seconds during a demonstration at a TCI employee residence.

4.4.4 Transmission Rates

Transmission rates will be tested and reported in a subsequent audit.

4.4.5 Y2K Compliance

@Home is addressing Y2K compliance. At this point the auditors cannot confirm @Home's compliance with Y2K. See Appendix 4 for @Home's "Year 2000 Readiness Disclosure".

5. Service Availability

This section of the audit evaluates the expanded programming services available to TCI customers. Specifically the audit evaluates whether or not TCI has upgraded its cable TV service to offer 70 channels of programming and to offer @Home Internet service in Alki/West Seattle and TCI II.

5.1 Survey Methodology

To evaluate service availability, the auditors conducted telephone interviews with 35 TCI and @Home customers. A sample interview lot was randomly selected from TCI's customer list of over 1000 customers located in Alki/West Seattle and over 1000 customers located in the TCI II franchise area. In Alki/West Seattle, every fourth customer was called until at least five customers in each zip code were interviewed. Customers interviewed live in ZIP codes 98106, 98116, 98126, 98136, 98146 and 98133. To evaluate upgrades in the TCI II franchise area, a random selection of customers located within the 98133 ZIP code area were interviewed.

Twenty-five surveys were completed with West Seattle customers and 10 surveys were completed with customers located in TCI II. Twenty-six interviews were completed with cable TV customers and 24 interviews were completed with @Home customers. All interviews were conducted between June 10 and July 7, 1999. A copy of the survey questions is available in Appendix 5.

The survey conducted for this portion of the audit is qualitative and therefore its results are not statistically significant and cannot be projected into the overall population of cable TV and @Home subscribers in Seattle.

5.2 Survey Findings

5.2.1 Cable TV

All of the customers interviewed currently receive TCI's upgraded expanded basic cable TV service with 70 channels. Interviewed customers that did not subscribe to expanded service, either because they signed up for only the basic service, the digital cable or @Home service, were not included in the cable TV evaluation. Twenty-six interviews were completed for the cable TV portion of the questionnaire, sixteen in West Seattle and ten in TCI II. A copy of the quantitative survey results is available in Appendix 6.

Overall customers were fairly satisfied or highly satisfied with their cable TV service and the level of customer service offered by TCI. Several customers mentioned that programming could be improved and some suggested that customizing their channel selection would be desirable. One customer who gave a mediocre score for programming content and variety considers switching to Direct TV because there are more programming options with a satellite provider. Other unhappy customers relayed at least one incident of less than satisfactory service.

5.2.1.1 Programming Evaluation and Service Quality

Programming

When asked to rank the quality of TCI's cable TV service, customers rated program content and variety between average and high. Customers indicated that TCI offers too many channels that the customer does not watch, but still must purchase. Many customers indicated that they would prefer to customize their service package and station selection.

Most customers ranked the on-screen menu functionality between highly satisfactory and average. Unsatisfied customers complained that the guide was not convenient to use or the graphics were fuzzy.

Customers ranked video and audio quality very high. Although one customer indicated that his service was disrupted about 25% of the time because of a shadow that blurred the picture.

Service Disruption

Almost all of the customers interviewed have experienced service disruption less than 10% of the time while watching TCI cable TV. Most customers commented that their service was disrupted only once or twice.

5.2.1.2 Customer and Repair Service Evaluation

Customer Service

Most customers who answered the cable TV questions, have called TCI cable TV customer at least once. Of the customers who called customer service with a question, one received his answer from a recorder and did not have to speak with a customer service representative. Otherwise, customers needed to speak with a live person to answer their question or resolve their problem.

Survey participants ranked TCI's cable TV customer service, in terms of both courteous and professional attitude and knowledge, between average and highly satisfactory. Two customers mentioned that the quality of customer service has improved within the last year. Customers that were not satisfied with TCI customer service had requested information or repair service and felt the response was inadequate. For instance, one customer requested a new channel line up card when her expanded basic service was upgraded, but only received a copy of the old channel listing. Another customer had shadows on several stations. Although customer service explained that the shadow would disappear after the network construction upgrade, it has not and the problem continues[5].

Customers were satisfied with the length of time it took to speak with someone at TCI customer service. Most customers held did not have to hold the line for an answering machine and only waited between 30 seconds and 2 minutes to speak with a customer service representative. The customers that waited more than 2 minutes for a customer service person noted that they either called a while ago or called on a weekend. Two-thirds of customers have never received a busy signal. For those customers that have received busy signals, most indicated that it has been only once or twice.

[5] ZIP code 98133

Repair Service

Most customers have placed an on-site installation or repair request with TCI and the work wsa completed within 3 days. A few installations took over one week to schedule. The installations or repairs that could not be scheduled for over a week took place as recently as within the last month and as long ago as 2 years.

Customer Rebates

The auditors did not request customer rebate information from Alki/West Seattle customers. TCI II residents indicated that they received rebates while their upgrade was upgraded. One apartment manager indicated that he had received rebates for his apartment complex. A tenant in a different apartment complex indicated that he has received rebates. Another apartment tenant claimed that he did not recall receiving a rebate on his bill, but did not call TCI to follow up.

5.2.2 @Home

Twenty-four interviews were completed in Alki/West Seattle for the @Home portion of the questionnaire. All customers interviewed in Alki/West Seattle either had @Home or had access to the service.

Results for the @Home service were mixed. While a majority of the customers are pleased or very pleased with the service itself and with @Home customer service, a significant one third to one quarter are sincerely hopeful for improved service offerings. Customer dissatisfaction is a result of unfulfilled expectations in quality of service and customer service. Customers expect that the Internet speed would be faster and that customer service and problem solving would be more effective and efficient. Dissatisfied customers seemed to be more technically savvy and therefore have higher expectations for service and speed than satisfied customers. They also tend to perform more advanced functions, like file transfer protocol (FTP) downloads, that require higher levels of speed and customer service knowledge.

5.2.2.1 Quality of the @Home service

Speed and Access

Two-thirds of customers (18 of 24) indicated that, compared to a regular telephone line, the @Home service is meeting their expectations for speedy Internet access. One-third of customers interviewed said that @Home did not meet their expectations for fast access.

Most @Home users were fairly satisfied and agreed to having immediate and uninterrupted access with @Home; however, 8 of the 22 satisfied customers admitted having experienced accessing difficulties once or twice since using @Home. None of the users that subscribe to both @Home and TCI cable TV have experienced problems accessing the Internet while the TV is on.

Functionality

Most people were satisfied with the @Home e-mail service. One particular individual uses MSN mail because he has not managed to get @Home e-mail to work. Most customers interviewed never tried accessing the @Home e-mail account remotely. Those that have tried have been successful.

Most customers have not used the @Home search engine enough to comment. Of those that have most are not completely satisfied with the search engine and prefer to use other search engines.

Video and Audio Quality

Overall customers were satisfied with the video and audio quality of @Home compared to a regular telephone line.

Speed as Advertised

A little more than one-half (14) of customers said that the @Home service meets their expectations for speed and that the service seems to be, as advertised, 20 to 100 times faster than a regular phone line. Two users indicated that although @Home is faster, the overall speed is still affected by congestion at the site being accessed.

Slightly less than one-half of the customers interviewed said that the speed for @Home is not 20 to 100 times faster than a conventional dial up service as advertised. Three customers indicated that it is faster than accessing the Internet through a regular phone line, but not as fast as TCI claims. Two other users indicated that it is nowhere near as fast. One user indicated that @Home was only somewhat faster than a regular telephone line and that it locks up a lot more than a regular telephone line. One customer opted to use DSL because the speed of @Home was less consistent.

Most customers indicated that Internet service is slower during the early evening between 6:00 p.m. and 10:00 p.m. Some users indicated that it is the traffic on the server or an older processor that makes service slower, not the @Home service. Three customers that answered "yes" to slower service during certain hours of the day also noted that service was slower on weekends and two customers noted that service was also slower during lunchtime and during the afternoon, when the East Coast usage accelerates.

5.2.2.2 Quality of Installation, Customer and Repair Service

Eighteen customers ranked TCI customer service highly for installation, customer and repair service; however, five customers gave a low ranking to TCI for either installation or customer and repair service.

Installation

A majority of the customers (17) interviewed were pleased with the overall installation experience. Comments ranged between good and excellent. The eight customers that did not characterize the installation experience favorably had varying reasons. One customer (installation June 1999) was charged the full installation amount instead of the promotional price and felt that the installer was not properly trained. Two other customers (installation Dec 98 / Jan 99) mentioned that they were unhappy with the location of the holes @Home drilled in the house. Another customer (installation Oct 98) said that @Home missed the first three scheduled appointments.

Most customers (18 of 24) were fairly satisfied with the technician who completed the installation of the @Home service. The six that were not satisfied mentioned that the person who installed the service was unprepared, was not knowledgeable or missed several appointments. One customer characterized the overall installation experience as difficult, but said that @Home eventually solved the problem and the service ran smoothly. Another customer mentioned that it was evident that the installation person was "learning".

Most of the installations were completed on time as scheduled. A few installations required repeat visits in order to get the service running.

Customer Service and Repair Service

Most customers (18 of 24) have called @Home or TCI customer service with a question or to report a problem. Six customers have never called @Home or TCI customer service. Accessing @Home customer service has been fairly easy, but getting service results from @Home has been more difficult.

Customers were sure about who to call for service because the @Home installation crew left an 800 number as part of the service information. Only one customer called TCI instead of @Home. Most customers (16 of 18) have not received a busy signal when calling @Home customer services.

Since no customers could resolve their problems using only a touch-tone keypad, a short wait time to speak with a customer service representative was very important. Although most

customers did not have to wait long for an answering machine to pick up, and seven customers spoke with a person in less than less than two minutes, eleven customers had to wait more than 2 minutes to speak with a customer service person. Of the eleven that waited over 2 minutes, six held the line for up to 20 minutes before speaking with someone. Two waited about one half of an hour and two others waited over an hour and were switched around before speaking with a knowledgeable staff person.

When customers spoke with customer service representatives, they found mostly courteous, professional and knowledgeable staff. One customer noted that the @Home customer service was "better than AOL's"; another mentioned that although he was passed on to another service person, the person solved the problem immediately.

Most customers consider the @Home customer service staff to be courteous and friendly, but a few customers believe they are not knowledgeable enough to solve specific problems. One customer says @Home does not know how to work with Macintosh computers.

5.2.2.3 Customizing the @Home service

One half of the customers interviewed use the @Home home page. Some of those same customers use an alternate page as their home page: Netscape, Yahoo! or Altavista. The other half of the customers uses Yahoo!, Netscape or MSN only. Most of the customers said it was fairly easy to change their home page. One customer commented that when he called customer service for help to change the page, the customer service person was not very helpful. Another customer said he would have to spend more time to figure out how to do it. A third customer cannot access the @Home home page and therefore uses the MSN to access the Internet and MSN mail.

Most customers interviewed have not tried to use another Internet Service Provider (ISP) with their @Home service and most were not aware that this was possible. The three that use another service use MSN or AOL. Some indicated that they would be interested in working with another provider, while others thought it would not make financial sense to use both @Home and another ISP. One customer could not use another ISP because the @Home modem will not ring up the chosen ISP (NCF, Redmond, WA).

Three customers gave their general opinion of the @Home service, but did not complete the questionnaire. Of those three, two were satisfied with the service, and one was not satisfied. The unsatisfied customer had serious installation problems and opted not to order the service.

6. Conclusion

6.1 Technical Evaluation

The TCI cable TV network upgrade in Seattle is progressing well. The areas tested have 70 TV channels with full-expanded programming within the 54 – 750 MHz frequency spectrum. The two headends on the fiber ring plus the power supply redundancies provide excellent survivability and reliability for the cable TV and @Home services. A quality network is being maintained with all outages restored within three hours with 99.9469% availability (equivalent to less than one-minute outage period per day). TCI has activated 27,279 customers as of the end of June meeting the requirements under the franchise extension ordinance. The number of homes passed as of the end of June is 47,540.

The data transmission rates for downstream and upstream and the data contention rate have not been tested or verified. TCI may lack the resources and expertise to conduct these tests, as they are simply the carrier for @Home service. The Auditors are hopeful that by the next audit, TCI and @Home would be able to provide the capability to conduct these tests. Also the Auditors regret that they have not been able to visit the headends to confirm the network layout, but are again hopeful that by the next audit logistics will be provided for this to happen.

6.2 Service Evaluation

TCI appears to be in compliance with the franchise extension ordinance in terms of expanded service offerings in Alki/West Seattle and TCI II. In Alki/West Seattle, customers have access to about 70 channels with their expanded basic cable TV service with TCI. Alki/West Seattle customers also have high speed Internet access through @Home. TCI II residents have access to 70 channels through their expanded basic cable TV service with TCI. TCI II residents do not have access to @Home as of the date of this report.

Customer satisfaction of TCI cable TV and @Home's service offering is ranked as average or high for both services. In general there is a feeling that TCI service is satisfactory but they could continue to improve both service offerings and customer service performance. Many customers were pleased that the City performed an audit to determine compliance with the franchise extension ordinance and to evaluate customer satisfaction. While some customers mentioned a

less than satisfactory history with TCI, others recognized that TCI has improved its service offering and level of customer service. This feeling was expressed for both cable TV customers and @Home customers, but seemed to be more emphasized with @Home customers.

TCI cable TV customers are generally satisfied with the service. Customers ranked program content and variety, the on-line menu and video and audio quality between average and high. Similarly customers find customer service personnel to be courteous, professional and knowledgeable. Customer service representatives answer service calls quickly. On-site installations and repairs were scheduled fairly promptly, within 3 days of the request.

However, even the satisfied cable TV customers said that the service could be improved in terms of programming content and variety. Customers suggested channel customization as a solution to this problem. Customer service could also be improved according to some customers. These customers are unhappy with TCI because they did not address the problem or resolve it in a timely manner. Cable TV customers are hopeful that TCI continues to improve its services.

@Home also received mixed reviews. Many customers were perfectly satisfied with the speed and functionality of @Home service as well as with their installation and customer service experiences. In fact, interviewees rated the installation experience highly. They also easily determined who to call for questions or service problems. Busy signals were rare. Customer service representatives were generally courteous, professional and knowledgeable. Finally, customers found it fairly easy to change the @Home page when they tried.

The most significant obstacles @Home must address to satisfy a larger number of customers include slower than expected speed and long customer service wait time. Slow speed seems to be a problem for the Internet-savvy crowd, and since this group represents a substantial percentage of TCI's market, such dissatisfaction will likely affect a substantial portion of its customer base.

6.3 Recommendations

It is recommended that TCI execute or provide an explanation to the City of Seattle for low activation for the months of May and June 1999 and devise a way to test transmission and contention rates.

6.4 Audit Two

The second audit will assess Green Lake, Magnolia and Queen Anne. Audit Two will provide a technical and service evaluation of TCI's network upgrade for through September 1999.

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- Douglas Cooper, Manager of Technical Operations, TCI, 206.694.7015
- Bob Lippert, Network Construction Project Manager, TCI, 206.849.6590
- Bill Drake, 425.745.8400
- John Reid

8. Appendices

Appendix 1 - Cable modem specifications

Appendix 2 - Maintenance records

Appendix 3 - Node test results

Appendix 4 - Y2K compliance

Appendix 5 - Service availability questionnaire

Appendix 6 - Survey results